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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,052	03/19/2004	Jac-ryong Park	1572.1201	6935

21171 7590 06/21/2007  
STAAS & HALSEY LLP  
SUITE 700  
1201 NEW YORK AVENUE, N.W.  
WASHINGTON, DC 20005

EXAMINER
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ALEXANDER, REGINALD

ART UNIT	PAPER NUMBER
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1761

MAIL DATE	DELIVERY MODE
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06/21/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Supplemental  
Notice of Allowability**

Application No.

10/804,052

Examiner

Reginald L. Alexander

Applicant(s)

PARK ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the refiled IDS of 6/15/07.
2. ☒ The allowed claim(s) is/are 3-5, 10-14 and 16-21.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

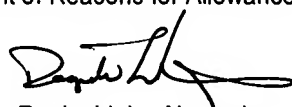
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date 5/07 copy filed 6/07
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material

5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_.
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_.

  
Reginald L. Alexander  
Primary Examiner  
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### EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Lucas K. Shay on June 18, 2007.

Claim 21, line 17      insert the following after "polar monomer"  
" ; the polar monomer is acrylic acid, methacrylic acid, alkyl ester of  
acrylic acid, alkyl ester of methacrylic acid, salt of acrylic acid, salt of  
methacrylic acid, or combinations of two or more thereof"

*Allowable Subject Matter*

The following is an examiner's statement of reasons for allowance: Claims 2-10 and 12-23 are allowed over the closest references cited below.

The present invention is drawn to a composition comprising or produced from nano-TiO<sub>2</sub>, a first polymer, and optionally a second polymer wherein the first polymer is polyvinyl butyral, an ethylene copolymer, an ionomer of the ethylene copolymer, or combinations of two or more thereof; the nano-TiO<sub>2</sub> is coated with a silicon compound, a metal oxide, and optionally an acid or its derivative, the acid is adipic acid, terephthalic acid, lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid, salicylic acid, or combinations of two or more thereof, the derivative is an ester or salt of the acid; the silicon compound is silicate, organoalkoxysilane, aminosilane, epoxysilane, mercaptosilane, SiO<sub>2</sub>, or combinations of two or more thereof; the metal oxide includes Al<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, or combinations of two or more thereof, the ethylene copolymer comprises repeat units derived from ethylene and a polar monomer; the polar monomer is the polar monomer is acrylic acid, methacrylic acid, alkyl ester of acrylic acid, alkyl ester of methacrylic acid, salt of acrylic acid, salt of methacrylic acid, or combinations of two or more thereof; the particle size of the nano-TiO<sub>2</sub> is  $\leq 100$  nm; and provided that if the first polymer is polyvinyl butyral, nano-TiO<sub>2</sub> is present in the composition from about 0.5 to about 10 weight % of the composition.

Frerichs *et al.* (U.S. 2005/0135994) teaches preparation of TiO<sub>2</sub> nanoparticles having particle size of less than 100 nm treated with silica and alumina. Particles are further silanized. Particles are used as filler for thermoplastics such a copolymer of ethylene and vinyl acetate. Useful applications include molded articles and film. The reference does not disclose compositions containing the ethylene copolymer recited in the instant claims.

Swank (U.S. 3,770,470) discloses a composition comprising polyvinyl butyral resin with varying amounts of (from about 5 wt %) of titanium dioxide pigment coated with alumina and 0.2 wt % of silica. The particle size of TiO<sub>2</sub> is on order of 150-400 nm. Swank does not teach or fairly suggest use of, or a means to obtain, titanium dioxide coated with alumina and silica

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having a particle size of  $\leq 100$  nm, as recited in the instant claims. Therefore, it would not have been obvious to one having ordinary skill in the art to modify the prior art in order to arrive at the subject matter of the instant claims.

Takahashi *et al.* (U.S. 6,472,445) teaches a film made from a composition comprising a blend of 100 pw of ethylene-vinyl acetate copolymer, and 0.5-20 pw of  $\text{TiO}_2$  coated with silica and alumina. The filler is commercially available as Tioxide R-TC30, and it has a particle size of 210 nm. The reference does not disclose or fairly suggest use of, or a means to obtain,  $\text{TiO}_2$  coated with silica and alumina having a particle size of  $\leq 100$  nm, as recited in the instant claims. Therefore, it would have been obvious to one having ordinary skill in the art to modify the prior art in order to arrive at the subject matter of the instant claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Other relevant art are includes:

Feinberg (U.S. 5,089,332 and 4,992,486; E. I. Du Pont de Nemours and Company) discloses an adhesive containing  $\text{TiO}_2$  (180 nm) coated with alumina and ethylene (meth)acrylic acid copolymer.

Honda *et al.* (U.S. 2006/0128836) teaches a coated titanium dioxide dispersion containing  $\text{TiO}_2$  coated with  $\text{SiO}_2$ , polyvinyl butyral, methyl isobutyl ketone, and *t*-butanol.

Tooley (U.S. 6,429,237) teaches use of titanium dioxide coated with alumina and silica as primary pigment in fluoropolymer based wire coating compositions wherein the titanium dioxide particles have a median particle size on order of about 230 nm.

Bettler *et al.* (U.S. 6,783,586; E. I. Du Pont de Nemours and Company) teaches coating of  $\text{TiO}_2$  pigment with hydrous silica and hydrous alumina in the presence of citric acid.

Shirakura *et al.* (U.S. 5,820,977) teaches photographic printing paper containing HDPE/LDPE and  $\text{TiO}_2$  coated with a combination of silica, alumina, and stearic acid. The particle size of titanium oxide must not be less than 100 nm because of difficulty of dispersion.

Mei *et al.* (U.S. 6,894,089) teaches a composition comprising silanized  $\text{TiO}_2$ , a polymeric material, and ethylene (meth)acrylic acid copolymer as compatibilizer.

Lin *et al.* (U.S. 2005/0282946; E. I. Du Pont de Nemours and Company) teaches preparation of titanium dioxide slurry containing silica-alumina treated nanograde titanium dioxide, commercially available as R-706 or W-6042. The titanium dioxide particles may also be surface coated with silanes or siloxanes. The slurry is used in an ink, which was sprayed onto polyvinyl butyral sheets. The sheets are used merely as a receiving layer, and there is no specific teaching that the receiving layer is to contain 0.5-10 wt % of nano- $\text{TiO}_2$ , as recited in the instant claims. Therefore, the invention of Lin *et al.*, taken as whole, is deemed not to anticipate or make obvious the subject matter of the instant claims.

Isogawa *et al.* (U.S. 7,207,904; reference does not antedate priority date of instant application) teaches a composition comprising thermoplastic polyurethane, ionomer of ethylene methacrylic acid copolymer, and  $\text{TiO}_2$  surface treated with  $\text{SiO}_2$ ,  $\text{ZrO}_2$ , and  $\text{Al}_2\text{O}_3$ .

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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June 19, 2007



DAVID W. WU  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700